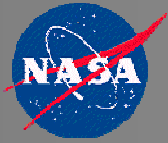


NATIONAL AERONAUTICS  
AND SPACE ADMINISTRATION

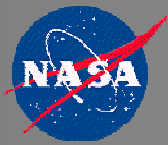
# **NASA Earth Science Data Systems (ESDS) Software Reuse Working Group**

Robert Wolfe (NASA GSFC), co-chair

Asset Repository and CM Strike Team Workshop  
Feb. 21, 2006

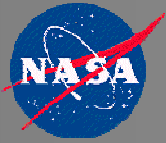


- 
- Drive down the cost and time of system development, and reduce/eliminate unnecessary duplication of effort
  - Increase flexibility and responsiveness relative to Earth science community needs and technological opportunities
  - Increase effective and accountable community participation



## Reuse WG Charter Highlights

- Purpose
  - Address issues required to enable and facilitate reuse of software assets within NASA Earth Science Enterprise (ESE)
- Goals
  - Demonstrate the feasibility and value of reuse
  - Increase the supply and availability of reusable assets
  - Make recognizable and easy-to evaluate candidate reuse solutions
  - Minimize the cost of infrastructure activities to support the community's reuse activities
  - Increase community capacity and interest in reusing existing assets
  - Contribute to the removal of existing barriers to reuse
  - Recommend incentives to encourage reuse
- Scope
  - Facilitating reuse across projects without interfering with local control of participating systems
  - Focusing on reuse of existing assets
  - Reusability of newly developed assets
  - Focusing not only of software code but also on design artifacts (architecture, design, ICDs, test plans, etc.)
  - Focusing on reuse of proven operational and NASA-ESE specific software assets



## Reuse WG Activities

### Reuse Implementation Projects

Efforts that result in the publication or use of a reusable component

### Reuse Incentive Activities

Awards and structural changes that directly or indirectly encourage reuse

### Outreach and Education Activities

Efforts that increase community awareness and understanding of benefits, best practices, etc

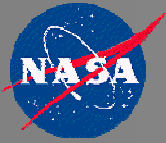
### Support/Enablement Activities

Efforts that provide tools and mechanisms to enable reuse

### Policy Change Activities

Efforts to reduce policy barriers to reuse


- Examples of work in some of these areas include:
  - Creating a web site to promote and provide information about reuse
  - Recommending that NASA create a *Reuse Enablement System (repository) for Earth science reusable software assets*
  - Providing policy recommendations to NASA to help encourage reuse



Navigation bar  
and tree

Recent news  
items

Upcoming  
events related  
to Earth  
science and/or  
software reuse

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Software Reuse  
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navigation

[Home](#)

- Reusable Assets
- Resources
- Open Source
- Funding Opportunities

news

- Initial Survey Findings Posted 2006-01-26
- Link submission form updated 2005-12-01
- More...

upcoming events

- AGU 2006 Joint Assembly Baltimore, Maryland, 2006-05-23
- 2006 Earth Science Technology Conference (ESTC2006) College Park, MD, 2006-06-26

**Home**

**Software Reuse**


Welcome to the Earth Science Data System (ESDS) Software Reuse Portal. Please visit the [About Us](#) for more information.

Software reuse can help the science community by reducing software development timescales, reducing costs, and contributing to the dissemination of knowledge and expertise. This Software Reuse Portal has been established by the Reuse Working Group to bring together a collection of resources that will facilitate reuse within the Earth science community. Over the next few months we will be researching a variety of resources in the Earth and Space Science reuse community. Our long-term goal is to establish a knowledge sharing community for software reuse in Earth science and, possibly, to establish a "marketplace" for reusable software development artifacts.

We have completed our survey to better understand the practice of software reuse within the Earth Science community. Preliminary [survey findings](#) have been published.

For more information, please visit our [News](#), [Site Map](#), [About Us](#), and/or [Contact](#) page.

**Developing an internal marketplace for reusable software development artifacts**



**Supply**  
Increase the supply and availability of reusable assets

**Demand**  
Demonstrate the feasibility and value of reuse through focused projects  
Increase community capacity and desire (knowledge & tools) to reuse existing assets

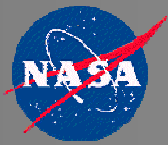
**Marketplace Enablement**  
Remove existing barriers to reuse  
Establish incentives to offset artificial/structural barriers to reuse

It should be as easy to find a good quality reusable software asset as it is to find a book on the internet

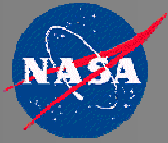
Created by [gsaerard](#)  
Last modified 2006-02-07 02:51 PM

Log in for WG  
members  
maintaining  
the site

*Goal is to become a  
central location for  
information about  
software reuse.*

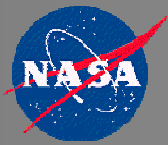


- A survey on the reuse practices of the Earth science community was conducted in 2004; results showed that:
  - Developers need to be able to easily locate and evaluate available reusable artifacts.
  - A catalog or repository for reusable artifacts is one of the best means of increasing software reuse within the community.
- In addition, the survey was repeated in 2005, with OMB approval (01/04/2005, Approval Number 2700-0117):
  - More diverse set of respondents (included non-government)
  - Received 100 responses from ~3000 invitations to participate
  - Basic results are the same as the 2004 survey
    - Main reasons for not reusing existing artifacts were not knowing that they existed and/or not knowing where to look for them
    - Catalog/repository rated as the best means of increasing reuse



## Reuse Enablement System (RES)

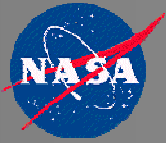
- Reuse Working Group recommended the establishment of a reuse catalog/repository subject to the findings of a technology evaluation / architecture study.
- A Reuse Enablement System is a combination catalog/repository that helps users find and obtain reusable software assets suitable for their needs.
- A trade study was conducted, evaluating a variety of sites on their ability to function as a software reuse enablement system for Earth science software developers.



## Requirements Background

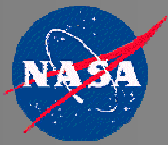
- Primary users of a Reuse Enablement System are NASA-funded software developers within the Earth science community who create software products.
- The Reuse Working Group collaborated for several months in 2004 to identify the important functional requirements needed for such a system.
- Requirements fall into a number of areas including:
  - General
  - Asset Usage
  - Asset Submission
  - Content Management
  - System Administration





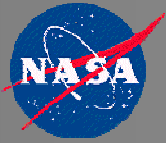
## System Requirements (1)

- Specific functional requirements identified from use cases for the system include:
  - Register User (in classes, e.g., Consumer or Provider)
  - Contribute/Update Assets (Providers can submit assets)
  - System Feedback (provided by the users)
  - Automatic Notifications (e.g., for new versions of an asset)
  - Discovering Assets (e.g., by search, hierarchy, list)
  - Register Asset Usage (to indicate active usage of the asset)
  - Asset Review (can include ratings)
  - Monitoring Feedback (both system and asset)
  - Workflow Management (e.g., reviewing asset submissions)
  - Capture Asset Needs (determine what users want, but can't find)
  - Catalog or Repository (list or store assets)

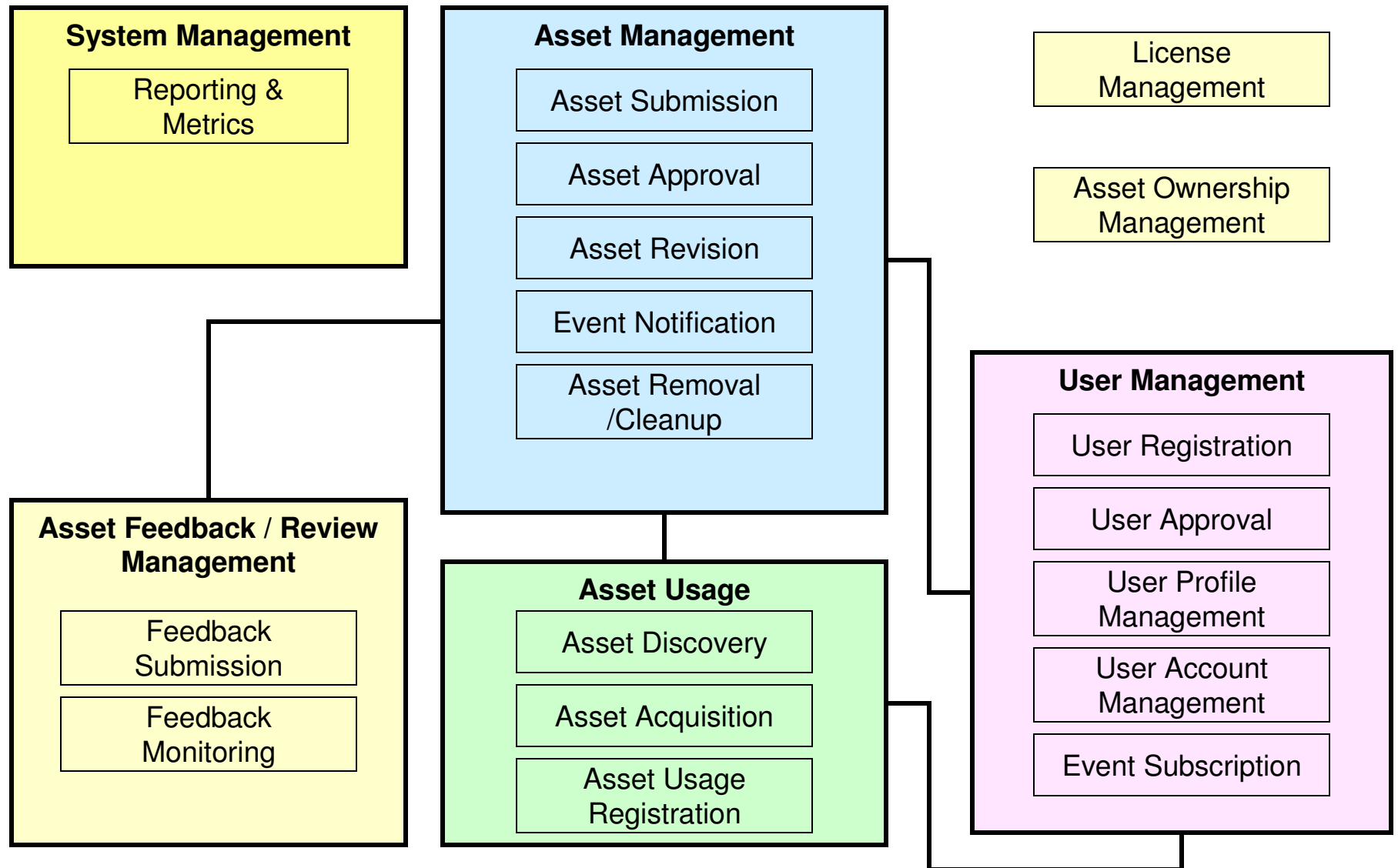


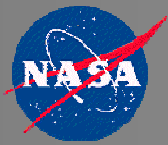
## System Requirements (2)

- Additional functional requirements include:
  - Minimal Operation Support (highly automated saves time/money by requiring less human support)
  - Performance (includes Section 508 compliance)
  - Security (e.g., of collected information, or for login passwords)
  - Technology (use appropriate mix of standard hardware and software for an easily maintainable system)
- Important non-functional requirements include:
  - Domain (Earth science focus)
  - Type of assets provided (small-sized components)

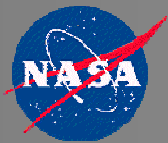


# Relationship of Requirements



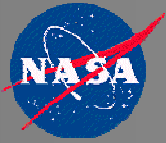


- NASA sites reviewed:
  - Global Change Master Directory (GCMD)  
<http://gcmd.gsfc.nasa.gov/>
  - Goddard Space Flight Center (GSFC) Open Source Software  
<http://techtransfer.gsfc.nasa.gov/software.html>
  - Ames Research Center Open Source Software  
<http://opensource.arc.nasa.gov/>
  - HDF-EOS Tools and Information Center [currently unavailable]
  - Computational Technologies (CT) Project  
<http://ct.gsfc.nasa.gov/software.html>
  - Earth Observing System Clearinghouse (ECHO)  
<http://www.echo.eos.nasa.gov/>
  - Planetary Data Systems (PDS) Software Download  
[http://pds.jpl.nasa.gov/tools/software\\_download.cfm](http://pds.jpl.nasa.gov/tools/software_download.cfm)



## Non-NASA Systems Reviewed

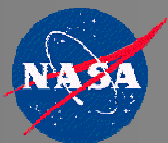
- Non-NASA sites reviewed:
  - Open Channel Foundation, hosts NASA's COSMIC Collection (<http://www.openchannelfoundation.org/cosmic/>)
  - SourceForge (<http://www.sourceforge.net/>)
  - Freshmeat (<http://freshmeat.net/>)
  - Scientific Applications on Linux (<http://sal.jyu.fi/>)
  - National Technology Transfer Center (<http://www.nttc.edu/>)
  - National HPCC Software Exchange (<http://rib.cs.utk.edu/catalog.pl?rh=226>)
  - Netlib (<http://www.netlib.org/>)
  - Savannah (<http://savannah.gnu.org/>)
  - Space Telescope Science Institute (STScI) Software and Hardware Products ([http://www.stsci.edu/resources/software\\_hardware](http://www.stsci.edu/resources/software_hardware))
  - Astronomical Software and Documentation Service (<http://asds.stsci.edu/>)



## Other Systems Inspected

- NASA sites:
  - Direct Readout Laboratory (<http://directreadout.nasa.gov/>)
  - Glenn Research Center Software Repository ([https://technology.grc.nasa.gov/software/cat\\_list.asp?Center=GRC](https://technology.grc.nasa.gov/software/cat_list.asp?Center=GRC))
- Non-NASA sites:
  - ArcScripts (<http://arcscripts.esri.com/>)
  - Wikipedia (<http://www.wikipedia.org/>)
  - Usenet newsgroups (e.g., <http://groups.google.com/>)
  - Ruby Application Archive (<http://raa.ruby-lang.org/>)
  - SciRuby (<http://sciruby.codeforpeople.com/>)
  - Comprehensive Perl Archive Network (<http://www.cpan.org/>)
  - FreeGIS (<http://www.freegis.org/>)

In general, these sites were too narrowly focused to warrant a detailed review.



## Find Data Sets by Topic:

**Users' Choice**  
Based on Monthly Statistics  
Data set titles  
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Earth Science Conference Calendar

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forest science, soils ...

**Land Surface**  
erosion, topography ...

**Atmosphere**  
precipitation, air quality ...

**Oceans**  
marine biology, salinity ...

**Biosphere**  
vegetation, zoology ...

**Paleoclimate**  
ice cores, land records ...

**Climate Indicators**  
air temperature, drought ...

**Solid Earth**  
geochemistry, seismology ...

**Cryosphere**  
frozen ground, sea ice ...

**Spectral / Engineering**  
radar, visible imagery ...

**Human Dimensions**  
land use, population ...

**Sun-Earth Interactions**  
auroras, solar activity ...

**Hydrosphere**  
rivers/streams, water quality ...

**Data Centers - Locations - Instruments - Projects - Platforms/Sources**

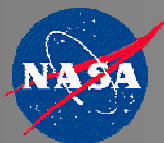
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Hazards Management  
Metadata Handling  
Models  
Reference and Information Services  
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- Domain is Earth science
- Type of assets provided are metadata about data sets (~16000) and, to a lesser extent, data services (~1240); in general, software is not provided
- Catalog of metadata
- Operational support is from a staff of ten members which includes four developers
- System technology includes Zope, CVS, Java, etc.
- Target audience is data users





# GCMD Data Set Page



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## Global Change Master Directory a directory to Earth science data and services

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Home Data Sets Data Services Collaborations Add to GCMD What's New Participate Calendar Links

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- ▣ Spectral/Engineering
- ▣ Sun-Earth Interactions

- ▣ Data Centers
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- ▣ Platforms/Sources
- ▣ Projects

- ▣ Geospatial One Stop Projects

- ▣ Free text Search

- ▣ Help Center

- ▣ Questions?

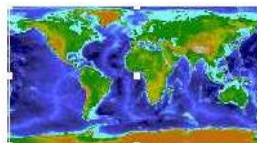
Parameters>BIOSPHERE>ANIMAL TAXONOMY>MAMMALS

Brief Record Distribution Attributes Coverage Personnel Full Record Update Record

### Mammal Species of the World

#### Geographic Coverage

Southernmost Latitude: -90.0  
Westernmost Longitude: -180.0  
Northernmost Latitude: 90.0  
Easternmost Longitude: 180.0



#### Summary

2005-08-12

The Mammal Species of the World (MSW) is a database of mammalian taxonomy. The names are organized in a hierarchy that includes Order, Family, Subfamily, Genus and Species. Records include the following fields: Scientific name, Author's name, and Year described, Original publication citation, Original name, Common name, Type species, Type locality, Distribution, Comments, Status. MSW contains the names of 4,629 currently recognized species of mammals. The data is from the book by Wilson, D. E., and D. M. Reeder (eds), 1993.

The list was compiled by an international team of contributors. It can be used as an on-line reference for identifying or verifying recognized scientific names and for taxonomic research; or adapted as an authority file for collections management activities of mammal collections.

#### Questions?

Information was obtained from <http://bubl.ac.uk/link/t/taxonomy.htm> and from <http://www.nmnh.si.edu/msw/>.

#### Data Center

**Data Center Name:** [SI/NMNH >National Museum of Natural History, Smithsonian Institution](#)

**Data Center URL:** <http://www.nmnh.si.edu>

**Dataset ID:** MSW

#### Personnel

**Name:** [DON E. WILSON](#)

**Email:** [wilson.don@nmnh.si.edu](mailto:wilson.don@nmnh.si.edu)

**Contact Address:**

National Museum of Natural History

Office of Biodiversity Programs

Smithsonian Institution

**City:** Washington

**Province or State:** DC

**Country:** USA

#### Data Set Citation

**Dataset Creator:** Smithsonian Institution

**Dataset Title:** Mammal Species of the World

**Dataset Release Date:** 1993

**Dataset Release Place:** Washington, D.C.

**Dataset Publisher:** Smithsonian Institution

**Online Resource:** <http://www.nmnh.si.edu/msw/>

#### Related URL

**Content Type:** BDP METADATA

**URL:** <http://metadata.nbi.gov>

**Description:**

Metadata in Biological Data Profile format.

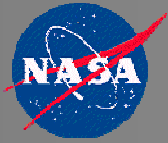


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+ Freedom of Information Act  
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Editor: Gene Major  
NASA Official: Lola Olsen  
Last Updated: September 1, 2005





## NASA OPEN SOURCE SOFTWARE

NASA conducts research and development in software and software technology as an essential response to the needs of NASA missions. Under the NASA Software Release policy, NASA has several options for the release of NASA developed software technologies. These options now include Open Source software release. This option is under the NASA Open Source Agreement "NOSA".



The motivations for NASA to distribute software codes Open Source are:

- to increase NASA software quality via community peer review
- to accelerate software development via community contributions
- to maximize the awareness and impact of NASA research
- to increase dissemination of NASA software in support of NASA's education mission

## PROJECTS

### [Livingstone2/Skunkworks](#)

Livingstone2 is a reusable artificial intelligence (AI) software system designed to assist spacecraft, life support systems, chemical plants or other complex systems in operating robustly with minimal human supervision, even in the face of hardware failures or unexpected events.

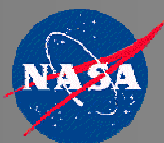
### [IND: Creation and Manipulation of Decision Trees from Data](#)

A common approach to supervised classification and prediction in artificial intelligence and statistical pattern recognition is the use of decision trees. A tree is "grown" from data using a recursive partitioning algorithm to create a tree which (hopefully) has good prediction of classes on new data. Standard algorithms are 1) that of Breiman, Friedman, Olshen, and Stone; and 2) Id3 and its successor C4 (by Quinlan). As well as reimplementing parts of these algorithms and offering experimental control suites, IND also introduces Bayesian and MML methods and more sophisticated search in growing trees. These produce more accurate class probability estimates that are important in applications like diagnosis.

### [CODE](#)


CODE is a software framework for control and observation in distributed environments. This framework enables the observation of distributed resources, services, and applications. Observations are made by modular components called sensors, the information observed is encapsulated as events, and these events are transmitted from where they are produced to whoever wants to consume them using an event management framework. Further, the CODE framework allows people or agents to control a distributed system by allowing them to take actions on remote systems using modular

- Domain is general science
- Type of assets provided are open source packages produced by NASA (11 finished products)
- Acts as both a repository and a catalog
- Operational support is presumed to be small
- System technology is JavaServer web pages
- Target audience is software developers and users

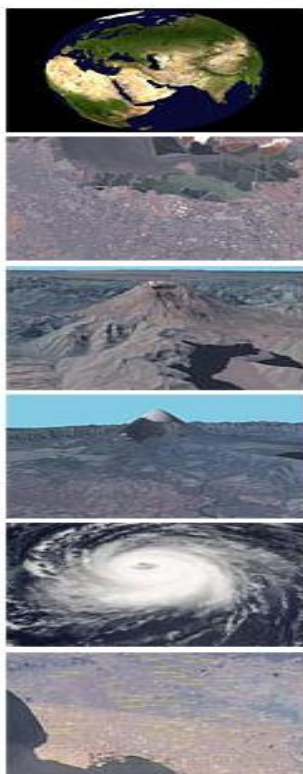


## AMES RESEARCH CENTER

Ames Home > Open Source Software

-  **NOSA Software Agreement**
-  **Other NASA Software**

### SCREENSHOTS



## WORLD WIND

[ [Project Home Page](#) ] [ [Software](#) ]

World Wind allows any user to zoom from satellite altitude into any place on Earth, leveraging high resolution LandSat imagery and SRTM elevation data to experience Earth in visually rich 3D, just as if they were really there.

Particular focus was put into the ease of usability so people of all ages can enjoy World Wind. All one needs to control World Wind is a two button mouse. Additional guides and features can be accessed through a simplified menu. Navigation is automated with single clicks of a mouse as well as the ability to type in any location and automatically zoom into it.

The World Wind install package is all you need to get started. It contains all the other requirements such as the .NET runtime and managed DirectX library. Just download the ZIP file, extract and run the setup program.

World Wind can display a combination of data from a variety of sources...

- Blue Marble – A full true color Earth as seen on NASA's Earth Observatory
- LandSat 7 – An extremely detailed mosaic of imagery that's detailed enough to see freeways, stadiums, anywhere on the Earth.
- SRTM – Elevation data gives rise to mountains, volcanoes, hills, and valleys.
- Animated Earth – A collection of Earth science data set in motion. See how hurricanes move and fires spread.
- GLOBE – See temperature, rainfall, and more across the entire globe.
- Country & State borders – See outlines directly on the Earth as they trace rivers, mountain ridges, or latitude & longitude lines.

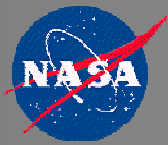
For a thorough list of features, user manual, key chart, screenshots and more, please visit <http://learn.arc.nasa.gov/worldwind/>

## SOFTWARE PACKAGES

### World Wind 1.3

The WorldWind virtual globe application and the independent components used to implement it.

[Download Page](#)



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- 3 7.7...

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Providing free services to Open Source developers

Project of the month  
**MinGW**  
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Registered Projects: **103,140** Registered Users: **1,145,813**

**Site News**

**TechForge and Eclipse Channels Launched** 2005-06-28  
TechForge -- vertical channels focusing on specific technologies -- has launched, with the first channel devoted to Eclipse. Check it out: everything you ever wanted to know about Eclipse.  
[See the full press release]

- ♦ **New Statistics Engine and Advanced Search Facility** 2005-06-08
- ♦ **SourceForge.net Surpasses 100,000 Projects!** 2005-05-17

[News archive]

**Software Categories**

Clustering	Database	Desktop	Development
Enterprise	Financial	Games	Hardware
Internet Phone	Multimedia	Networking	Security
SysAdmin			

**Project News**

**Firefox extension for ClamWin**  
avantman42 - 09/26/05 06:32 - ClamWin Free Antivirus  
A Firefox extension is now available that uses ClamWin to scan downloaded files for viruses. It requires Firefox v1.5, which is currently in beta, and due to be released later this year.  
[Read More]

**Gallery 1.5.1 Release**  
ckdake - 09/26/05 06:32 - Gallery  
Gallery is a slick, intuitive web based photo gallery with authenticated users and privileged albums. Easy to install, configure and use. Photo management includes automatic thumbnails, resizing, rotation, etc. User privileges make this great for communities.  
[Read More]

**Openl 1.1 Releases: Open Source BI Becomes More Real**  
sandeep\_giri - 09/26/05 06:31 - Openl: Web-based BI Application for OLAP  
Openl is an open source BI application that provides out-of-box OLAP analysis and reporting. Openl is available as a J2EE web application, and supports XMLA-compliant OLAP servers including Microsoft Analysis Services and Mondrian. Users can point Openl to any relational database and start publishing interactive OLAP reports on the web. Future versions of Openl will enable analysis of other data sources such as relational databases and data mining models.  
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**IBM Apache Geronimo Application Server Challenge**

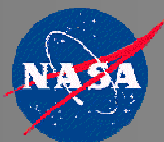
Apache Geronimo integrates dozens of Open Source projects under one roof to help you manage your development projects. Download it fast and free--and be entered into a contest to win a 42" Plasma HDTV or Sony(tm) PSP. No registration for download required.  
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- Domain is general software
- Type of assets provided are open source packages (approximately 102000 final products, not small components)
- Repository
- Operational support is from eleven full-time staff members
- System technology is PHP web pages
- Target audience is software developers and users





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## Project: bika: Summary

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BIKA is a laboratory information management system (LIMS) built on top of Zope and Plone, and coded in Python.

- Development Status: 5 - Production/Stable
- Intended Audience: Science/Research
- License: GNU General Public License (GPL)
- Operating System: OS Independent (Written in an interpreted language), OS Portable (Source code to work with many OS platforms)
- Programming Language: Python
- Topic: Bio-Informatics, Chemistry, Earth Sciences, Information Analysis
- Translations: Afrikaans, English
- User Interface: Web-based

Project UNIX name: bika

Registered: 2005-08-05 07:12

Activity Percentile (last week): 98.63

[View project activity statistics](#)

[View list of RSS feeds available for this project](#)

Need support? See the support instructions provided by this project

#### Latest File Releases

Package	Version	Date	Notes / Monitor	Download
<b>bika</b>	1.0.1	September 9, 2005	-	<a href="#">Download</a>

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- Bugs (0 open / 0 total)

[Bug Tracking System](#)

- Support Requests (0 open / 0 total)

[Tech Support Tracking System](#)

#### Developer Info

Project Admins:

[jorisgoudriaan](#)

[lemoene](#)

[rohecompaan](#)

Developers: 3

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##### Document Management Guide

This free overview helps you learn document management basics.

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[www.WorldViewltd.](#)

##### Document Software

Free Directory - Find and Comp Document Management Software.

[www.captterra.com](#)

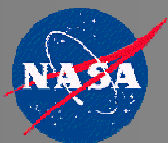
##### Document Management

M-Files - easy document management. Download a free evaluation version

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##### FREE WHITEPAPER

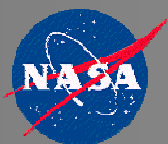
[Zultys white p](#)



# NASA Systems Summary

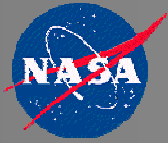
Requirement / Feature	Global Change Master Directory (GCMD)	GSFC Open Source Site	Ames Open Source Site	HDF-EOS Tools and Information Center	Computational Technologies Project	Earth Observing System Clearinghouse (ECHO)	Planetary Data Systems Software Download
Domain	Earth science	Earth and space science	General science	Earth science, HDF/HDF-EOS	Earth and space science	Earth science	Planetary astronomy
Type of Assets	Data sets, data services	Open source packages	Open source packages	Applications	Applications and source code	Metadata	Tools, binaries and source
Register User	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆
Contribute/Update Assets	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆
System Feedback	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆
Automatic Notifications	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆
Discovering Assets	Hierarchy, Search	List	List	List, Filter	Hierarchy	Search	List
Register Asset Usage	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆
Provide Asset Review	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆
Monitoring Feedback	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆
Secure Log In / Registration	N/A	NO	NO	NO	N/A	YES	N/A
Catalog or Repository	Catalog	Both	Both	Repository	Catalog	Catalog	Both
Operation Support	Large	Small	Small	Inactive	Small	Available	Small
Technology	RSYNC, Zope, CVS, Linux, Java, JavaServer Pages, XML, Apache, Oracle/PostgreSQL, Struts, Lucene, XSLT, Dreamweaver	PHP	JavaServer Pages	Cold Fusion	HTML	XML (WSDL), SOAP, UDDI	Cold Fusion

Legend:  
No functionality = 0 stars  
Some functionality = 1-2 stars  
Full functionality = 3 stars



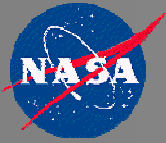
# Non-NASA Systems Summary

<b>Requirement / Feature</b>	<b>Open Channel Foundation / COSMIC</b>	<b>SourceForge</b>	<b>Freshmeat</b>	<b>Scientific Applications on Linux</b>	<b>National Technology Transfer Center</b>	<b>National HPCC Software Exchange</b>	<b>Netlib</b>	<b>Savannah</b>	<b>Space Telescope Science Institute</b>	<b>Astronomical Software and Documentation Service</b>
Domain	General	General	General	Scientific	Federal technologies (mostly NASA)	HPPC	Mathematics	General	Astronomy	Astronomy
Type of Assets	Applications and source code	Open source applications	Open source applications	Tools and packages with source code	Applications	Tools and end packages	Source codes	Tools and packages	Packages, source	Packages, source
Register User	★★★★	★★★★	★★★☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	★★★☆☆	☆☆☆☆	☆☆☆☆
Contribute/Update Assets	★★★☆☆	★★★★	★★★☆☆	☆☆☆☆	★★★☆☆	☆☆☆☆	★★★☆☆	★★★☆☆	☆☆☆☆	★★★☆☆
System Feedback	★★★☆☆	★★★☆☆	★★★☆☆	☆☆☆☆	★★★☆☆	☆☆☆☆	★★★☆☆	★★★☆☆	★★★☆☆	★★★☆☆
Automatic Notifications	★★★☆☆	★★★☆☆	★★★☆☆	☆☆☆☆	★★★☆☆	☆☆☆☆	☆☆☆☆	★★★☆☆	☆☆☆☆	☆☆☆☆
Discovering Assets	List, Hierarchy, Search	Hierarchy, Search	Hierarchy, Search	Hierarchy, Search (broken)	List, Hierarchy, Search	Hierarchy, Search	Hierarchy, Search	List, Search	List, Hierarchy	List, Hierarchy, Search
Register Asset Usage	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆
Provide Asset Review	☆☆☆☆	★★★☆☆	★★★★	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆
Monitoring Feedback	★★★☆☆	★★★☆☆	★★★☆☆	☆☆☆☆	★★★☆☆	☆☆☆☆	★★☆☆	★★★☆☆	★★★☆☆	★★★☆☆
Secure Log In / Registration	YES	YES	NO	N/A	N/A	N/A	N/A	YES	N/A	N/A
Catalog or Repository	Repository	Repository	Repository	Catalog	Both?	Catalog	Repository	Repository	Repository	Catalog
Operation Support	Medium	Large	Medium	Inactive	Uncertain	Inactive	Large	Large	Small	Medium
Technology	PHP, MySQL	PHP	XML-RPC	HTML, Java	ASP	Repository In a Box	HTML	Perl, PHP, MySQL	HTML	HTML



## Study Conclusions

- A domain-specific catalog/repository system is needed to encourage and better enable software reuse within the community of Earth science software developers.
- Some collaboration with existing systems may be possible, but existing systems alone cannot meet the needs of our community.
- Existing tools like the SourceForge software can be used in developing a reuse enablement system.
- Existing domain-specific reusable artifacts in other catalogs and repositories can be linked to by the RES.



## Planned RES Structure

A web interface will provide users with easy access to the system.

Web Site Interface for Users

Customized components will be used to provide functionality beyond what the base system provides.

Customized Component

Customized Component

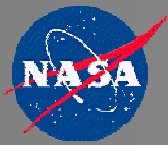
Customized Component

Existing Catalog/Repository System Software

*Goal is to provide a catalog/repository system that is easy to use by reusing existing components and building off of them as needed.*

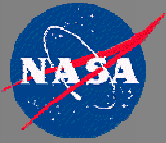
SourceForge, Savane, GForge, Repository In a Box, or a similar product will provide much of the required functionality.





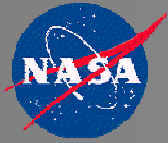
## Planned RES Features (1)

- The system will host or link to reusable software assets, typically source code, tools, and applications.
- Assets will be uploaded to the system through the web-based interface.
  - Registration as a “provider” will be required to upload assets
- Providers will be able to update assets in the system, but major changes may require administrator approval to ensure the asset is still relevant to the community.
- Metrics tracked will include number of downloads per asset and number of users who register their active use of an asset.
  - Downloading does not guarantee active usage, which is the more important measure for software reuse.

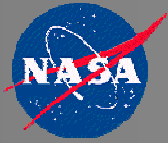


## Planned RES Features (2)

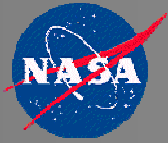
- The system is expected to be as automated as possible so that the support required is minimal.
  - Some level of support will be available to users.
- Ratings and reviews features will allow users to provide feedback about assets to the creators and other users.
  - A form of peer-review
- A number of other issues will be addressed as the planning of the RES continues, including
  - Tools used and supported
  - Protection of data rights and intellectual property
  - Classification of assets



- An architecture study is planned to select the most suitable base system for use in the RES.
  - System requirements will be revisited as planning and development continues, and revised if necessary
  - Prototype systems will be created and tested as part of the selection process
  - Additional functionality, such as services, will also be added in the future
- Policy related issues (e.g., how to handle misuse of the ratings/reviews feature) will be considered and addressed in conjunction with the architecture study.
- Implementation of the actual RES would take place after the architecture study (planned for completion this year).

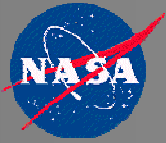


- Software Reuse Portal Web Site
  - <http://softwarereuse.nasa.gov/>
- Co-chairs
  - Vic Delnore <v.e.delnore@nasa.gov>
  - Robert Wolfe <robert.e.wolfe@nasa.gov>
- Mailing List
  - Ryan Gerard <ryan.gerard@gsfc.nasa.gov>
- Other Information
  - Jim Marshall <james.marshall@gsfc.nasa.gov>



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## **Backup Slides**



# System Requirements

- The Reuse Working Group collaborated for several months in 2004 to identify the important functional requirements needed for a Reuse Enablement System (RES), as illustrated in the figure.
- Additional functional requirements:
  - Minimal Operation Support
  - Performance
  - Security
  - Technology
- Important non-functional requirements:
  - Domain (Earth science focus)
  - Type of assets provided (small-sized components)
- Primary users of a RES are NASA-funded software developers within the Earth science community who create software products.

